PostgreSQL 16 Backend Development. Basic Course

Student's Guide

About this document

This guide is intended for those taking the PostgreSQL 16 Backend Development. Basic Course course, whether with an instructor or through self-study.

This guide consists of three main sections.

The first section, Setting Up the Environment, provides the information you need to prepare your working environment, set up the course virtual machine, and get it running. It describes the virtual machine provided to students, along with information about the virtualization systems used and their requirements.

The second section, Course Materials, explains where and how to access the learning materials you'll need for the course. It also covers the formats of these materials and the notation conventions used in them.

The third section, Self-Study Guide, offers helpful tips to make the most of the course materials when learning on your own.

Good luck, and enjoy your learning journey!

We'll be happy to get your feedback at edu@postgrespro.ru.

Setting Up the Environment

If you take the course at a training center, your workspace will be prepared for you.

For self-study, install a virtualization system (you'll need VirtualBox version 6.1 or later), then download and import the virtual machine from https://edu.postgrespro.com/16/DEV1-16-en.ova. If you have an ARM64 processor (such as a MacBook with Apple Silicon), use VirtualBox version 7.1 or later and the virtual machine at https://edu.postgrespro.com/16/DEV1-16-en-arm64.ova. The virtual machines at these links are updated to reflect any changes made to the course.

Note that you can only install the VM on a computer with a 64-bit operating system.

The VM runs 64-bit Xubuntu 24.04 as its guest OS, which is already configured for taking the course. You will need at least 2 GB of RAM.

You will be logged in as *student* user (password: student) automatically.

The Firefox browser in the VM environment is set up to display PostgreSQL documentation, which is stored locally. You do not have to be online to complete the course.

To manage files, you can use both the command line (ls, pwd, cd, ...) and GUI tools, such as mc or Thunar (built-in file manager). To edit files, you can choose from several pre-installed editors: vim, nano, gedit, mousepad.

Course handouts

The latest version of the course handouts is available at: https://edu.postgrespro.com/16/DEV1-handouts-16-en.zip.

You can download these materials into the VM by clicking the Get DEV1 handouts icon on the Desktop or running the get_handouts.sh script in the *student* user's home directory. The files will be downloaded into the dev1 subdirectory.

A summary of new features and changes introduced in PostgreSQL versions 13–16 that are covered in this course can be found at: https://edu.postgrespro.com/16/dev1-16-en/dev1_new_features.pdf.

Older versions of the materials (for example, the one that corresponds to the video) can be found at: https://edu.postgrespro.com/16/.

The main course handouts are provided in two formats (they differ only in appearance, the content is identical):

- html is good for browsing and copying code snippets
- pdf is more convenient for printing

These handouts include lesson slides, demos, and keys to practice tasks.

In addition to the main handouts, the course includes reference materials:

- A list of the main functions and data types (datatypes.pdf)
- A chart of the main tables of the system catalog, with corresponding psql commands (catalogs.pdf)
- A list of basic Unix commands (unix_commands.pdf)

All commands in demonstrations and answer keys start with a prompt. We use the following conventions:

- *user*$
  A prompt that ends with a dollar sign denotes a Unix command; it contains the name of the OS user that will run this command. For example, student$ means that the command has to be executed by the *student* user.
  To run a command on behalf of a different user (such as *postgres*), enter:
  sudo -u postgres command

However, it is usually more convenient to open another terminal, run
`sudo -i -u postgres`
once, and then run all commands on behalf of the *postgres* user in this terminal.

- `=>`
  An arrow prompt denotes a command entered in psql. If psql is not open yet, first run the
  `psql`
  command on behalf of the *student* OS user.

Self-study

If you are taking the course on your own, you should study the topics as they follow, lecture by lecture.

Course videos will be available at https://postgrespro.com/community/courses/DEV1.

Course materials can be used both in addition to the videos and independently. Apart from the slides, presentations also contain slide notes; they provide enough information to understand the topic. Besides, there are demonstrations for almost each lesson. Always try out the commands provided in these demos.

Practice tasks are an essential part of the course, as it’s impossible to master programming without writing code. It’s advisable to always look through the provided solutions: they can contain some additional information, which is not covered in presentations and demos. But do it only after you have completed the task on your own.

The course includes hands-on work with a training application called Bookstore — from designing the data schema to creating tables, views, functions, and triggers.

The application database doesn’t initially exist in the course virtual machine; you’ll need to create it yourself by completing the practice tasks for Lesson 7. If you try to run the application before that, you’ll get the error “database "bookstore" does not exist”. To have a fully functional application by the end of the course, you must complete all exercises marked with the book icon — these are the essential minimum. We also recommend completing the optional exercises as well.

While taking the course, use the provided reference materials. If you are not familiar with the Unix OS, take a look at its basic commands.

The system catalog chart can help you understand the database structure and use psql to get the descriptions of tables, views, and other objects.

You can use the summary of common data types and functions as a quick reference to supplement the existing documentation.

If you need to reset your PostgreSQL server instance data and settings to their initial state, run the following command:

```
student$ ~/reset.sh
```